Figures

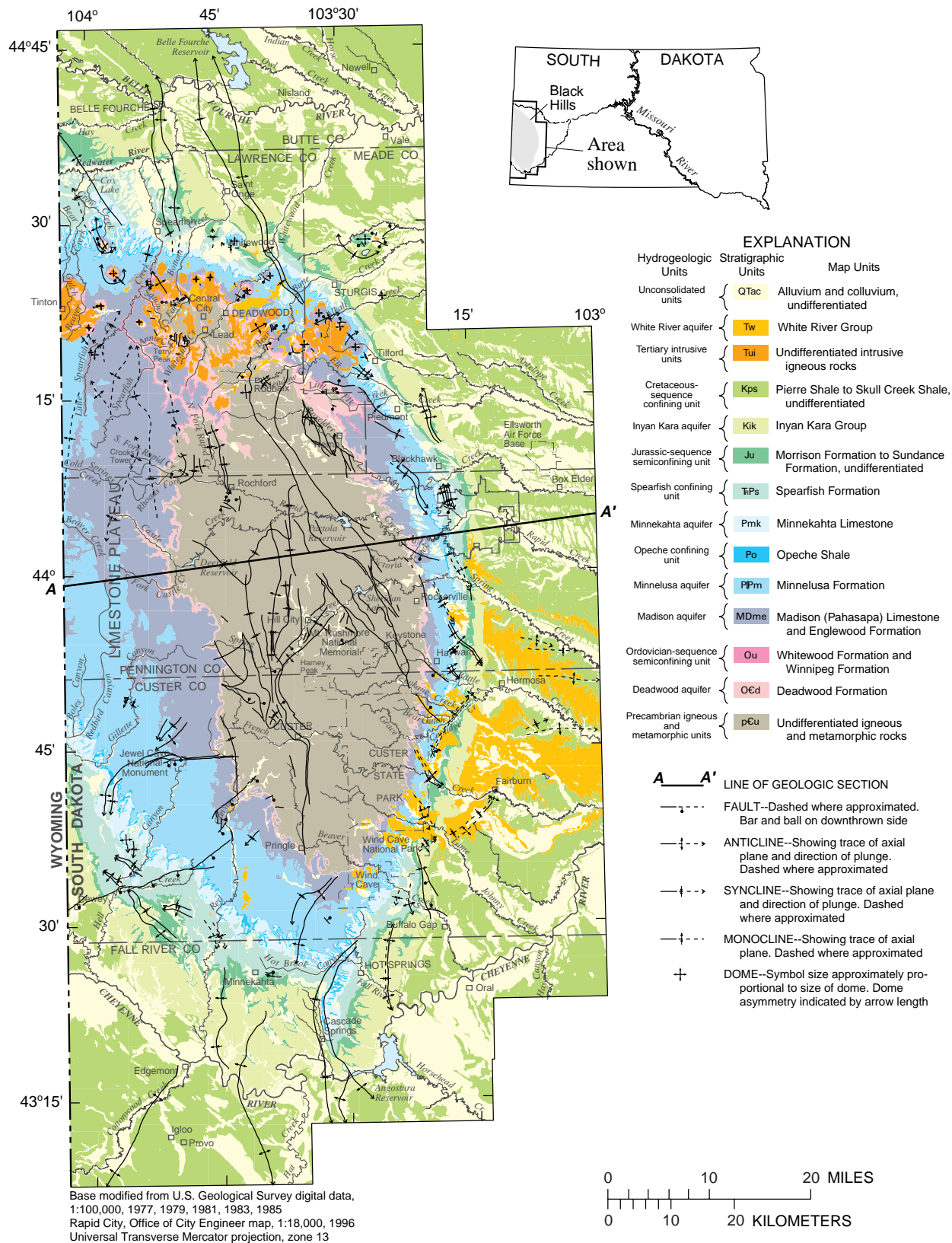**Figure 1**. Distribution of hydrogeologic units in the Black Hills area (modified from Strobel and others, 1999).

Minnelusa
Formation

LIMESTONE
PLATEAU

Madison   Limestone

Deadwood   Formation

Precambrian igneous and
metamorphic rocks

Deadwood Formation

Water
table

Spring
conduit

Cave

Flowing well

Minnelusa

Madison

Minnekahta   Limestone

Formation

Limestone

Inyan Kara
Group

Alluvial
aquifer

Potentiometric
surface of the
Madison
aquifer

EXPLANATION

Major aquifer

Confining unit

o~   Spring

Dip of sedimentary rocks exaggerated.
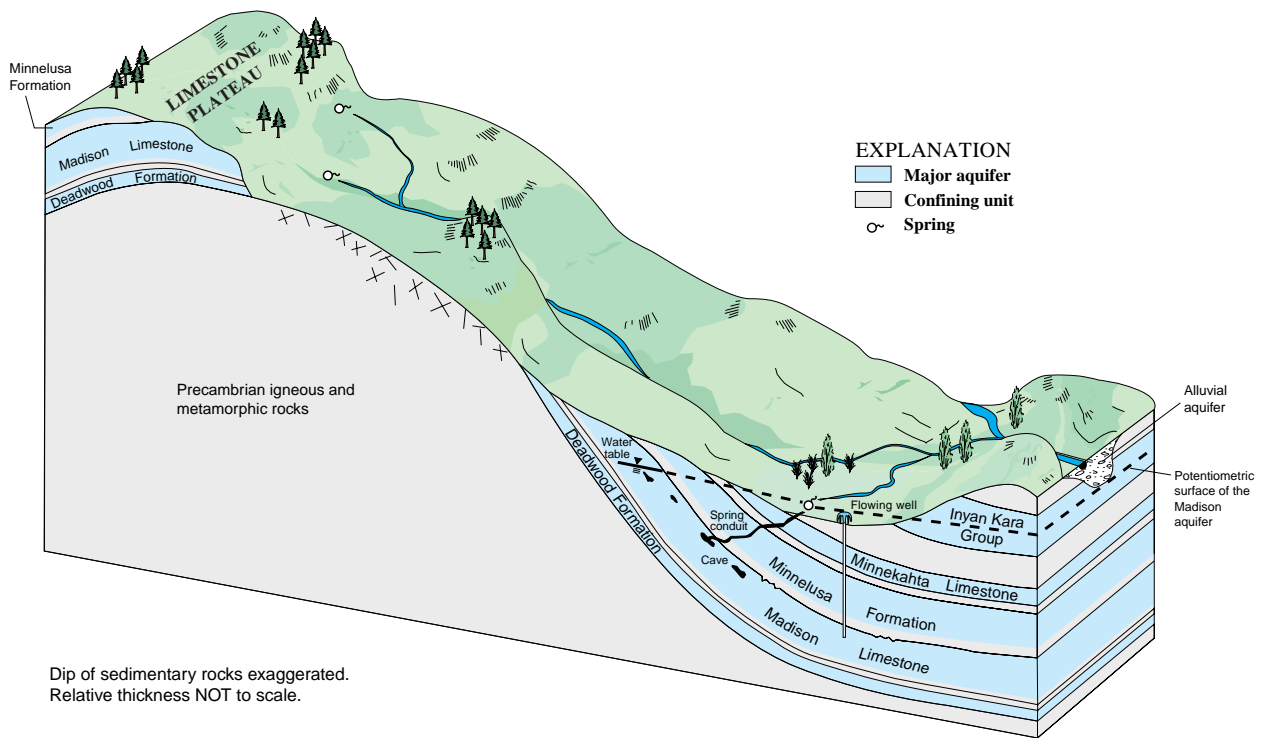Relative thickness NOT to scale.

Figure 2. Schematic diagram showing simplified hydrologic setting of the Black Hills area. Schematic diagram generally corresponds with geologic cross section shown in figure 20.
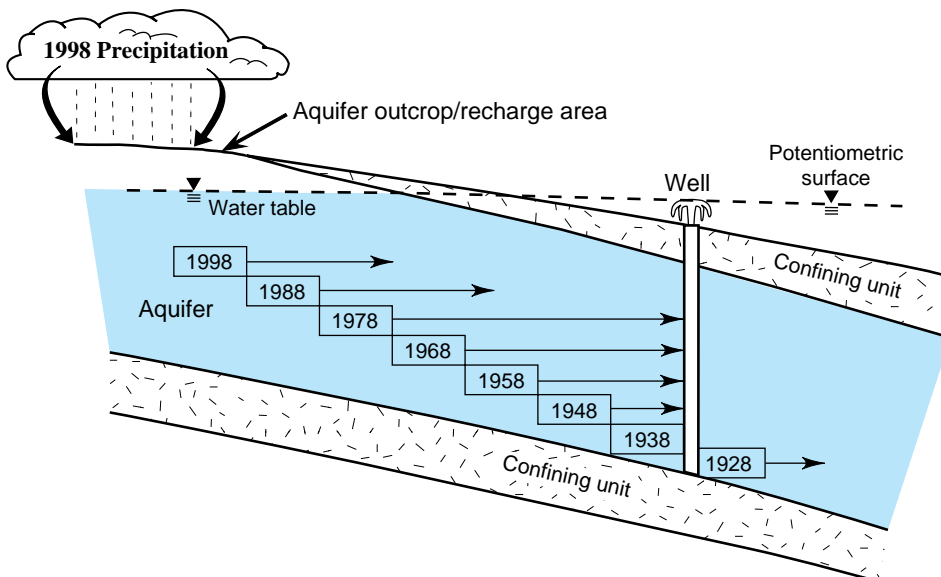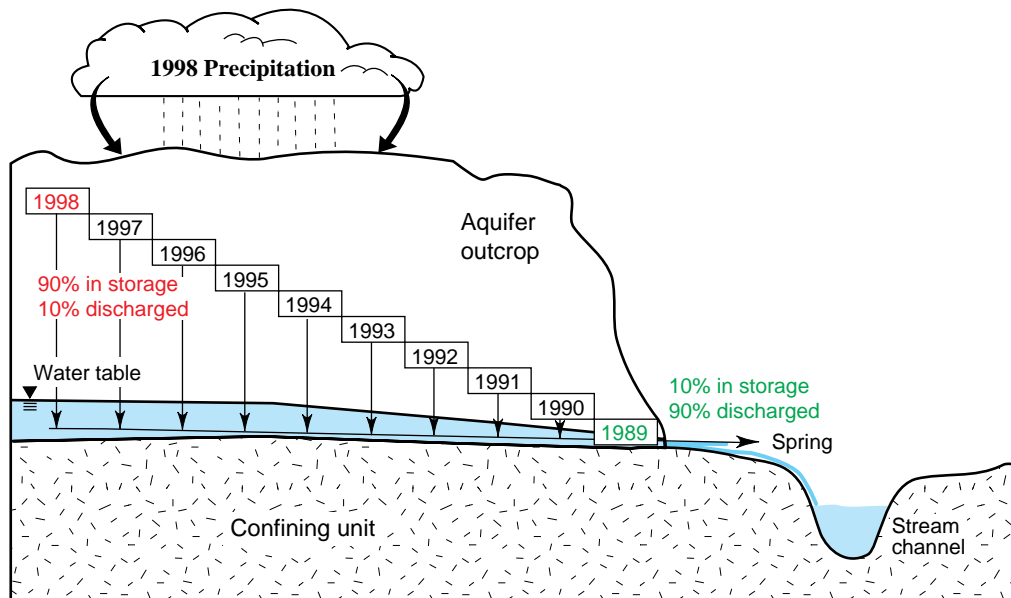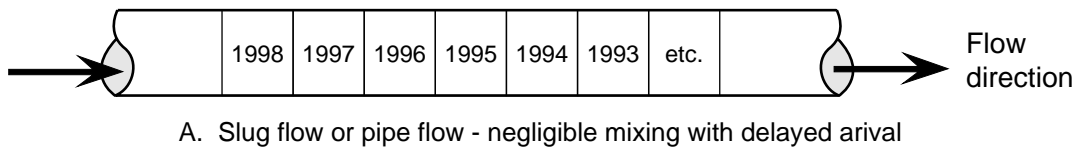
A. Slug flow or pipe flow - negligible mixing with delayed arival

B. Hypothetical water-table spring with maximum traveltime of 10 years - thorough mixing with immediate arrival

C. Well completed in artesian aquifer at considerable distance from recharge area - thorough mixing with delayed arrival

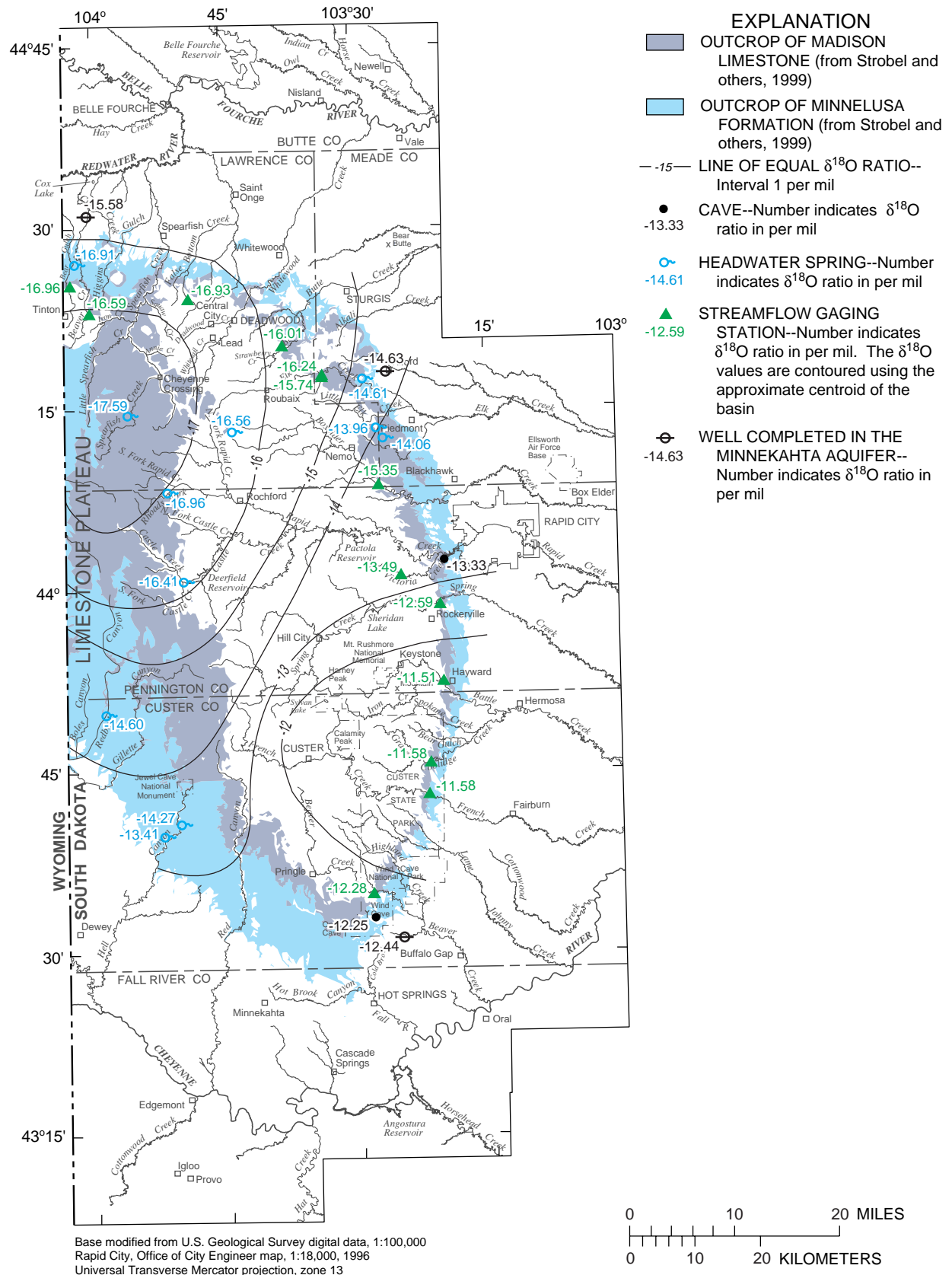**Figure 3.** Schematic diagrams illustrating mixing models for age dating for various ground-water flow conditions.

Figure 4. Generalized distribution of $\delta^{18}O$ in surface water and ground water in near-recharge areas.
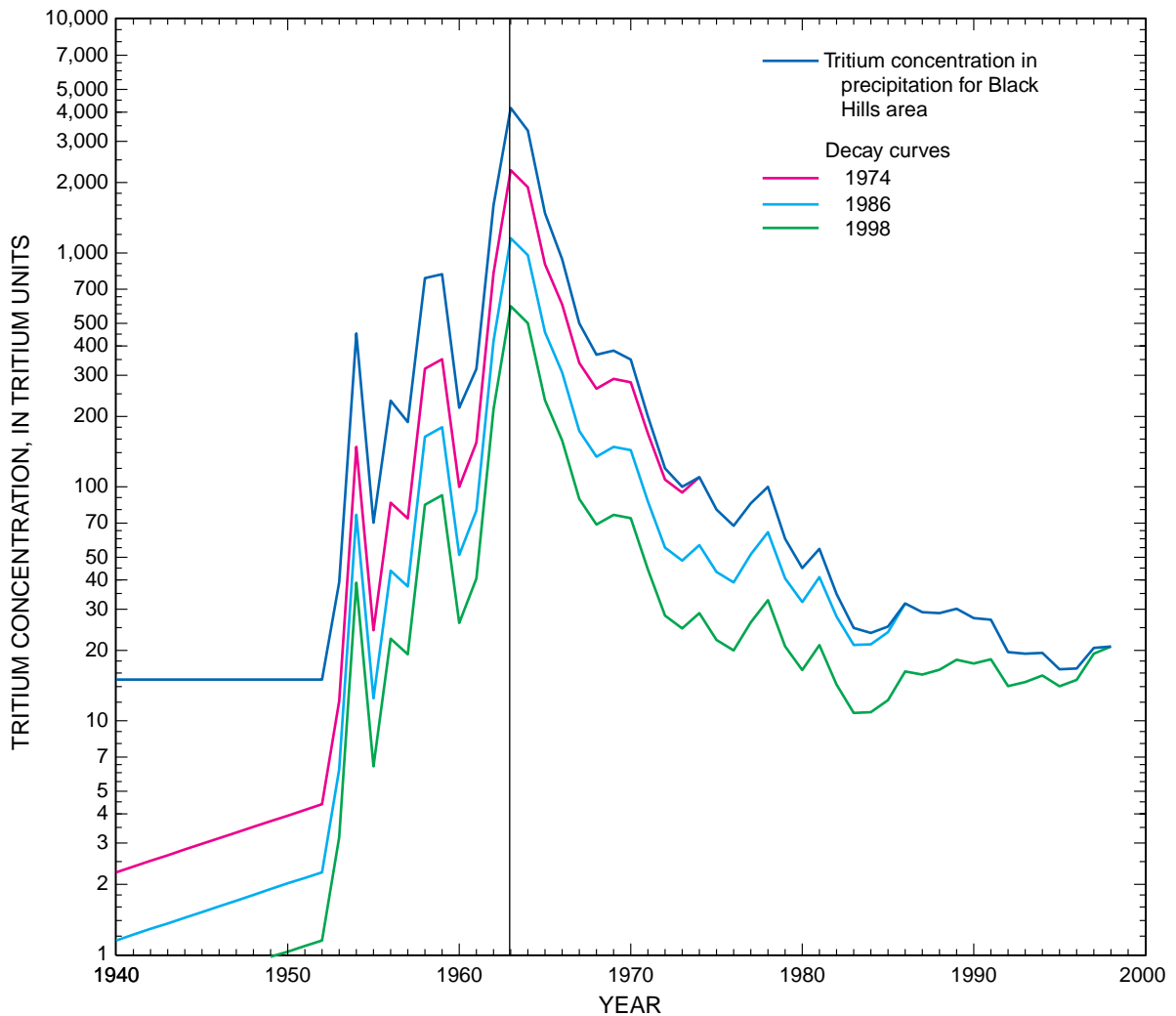
Figure 5. Estimated tritium concentrations in precipitation for Black Hills area and decay curves for selected years. Decay curves depict decayed tritium concentrations for selected sampling years. Maximum tritium concentrations of about 4,200 tritium units occurred in about 1963. Tritium has a half-life of about 12.43 years and decay curves are presented for selected 12-year increments that approximate this half life. Using 1963 as an example, the tritium concentration in a sample collected in 1974 containing water recharged in 1963 would be equal to about 2,200 tritium units. The tritium concentration would have decayed by almost one-half to 1,100 tritium units for a sample collected 12 years later in 1986, and again by one-half to about 600 tritium units for a sample collected in 1998.
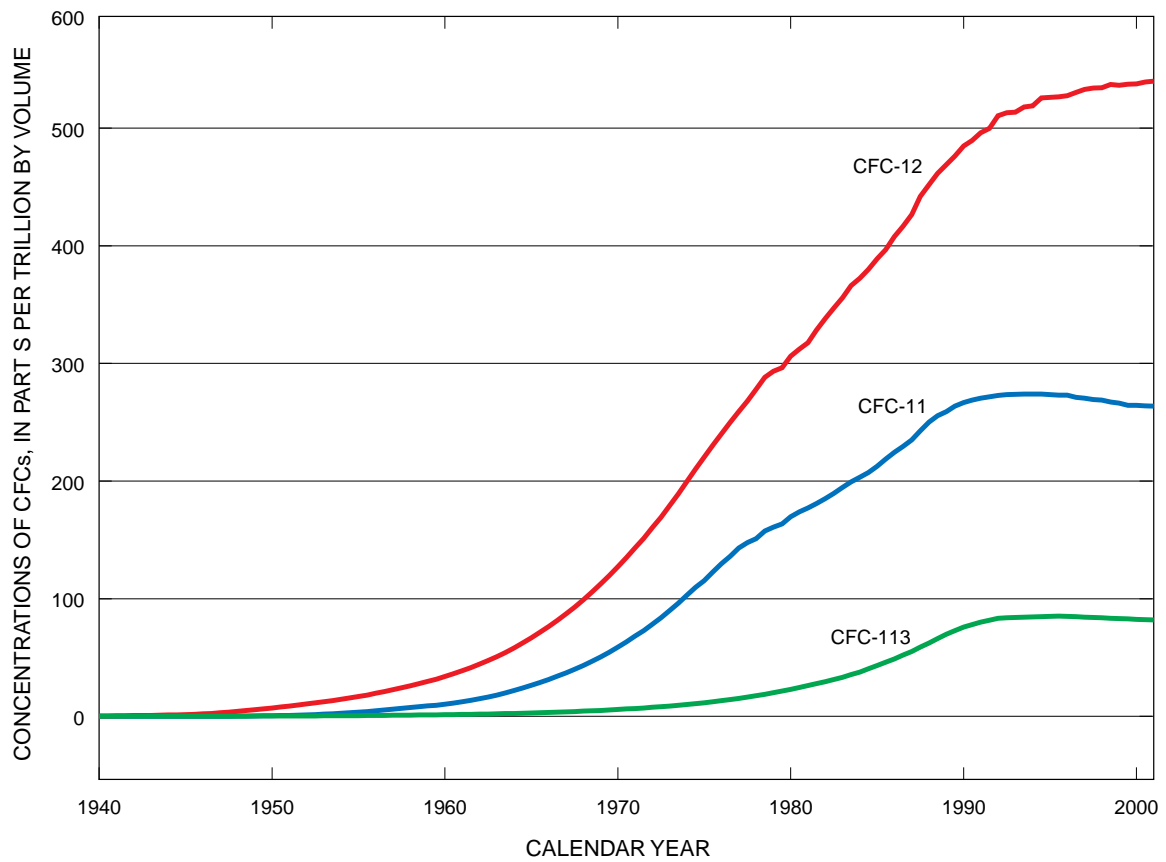
Figure 6. Concentrations of CFCs verses date.